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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,948	09/16/2003	Rajesh Tiwari	TI-36211	3857
23494	7590	11/28/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			CAO, PHAT X	
P O BOX 655474, M/S 3999			ART UNIT	
DALLAS, TX 75265			PAPER NUMBER	
			2814	

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<p align="center"><b>Advisory Action</b> <b>Before the Filing of an Appeal Brief</b></p>	<p>Application No. 10/663,948</p>	<p>Applicant(s) TIWARI ET AL.</p>	
	<p>Examiner Phat X. Cao</p>	<p>Art Unit 2814</p>	

**--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

THE REPLY FILED 14 November 2005 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
- a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
- b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
- Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**NOTICE OF APPEAL**

2. ☐ The Notice of Appeal was filed on \_\_\_\_\_. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

**AMENDMENTS**

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
- (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
- (b) ☐ They raise the issue of new matter (see NOTE below);
- (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
- (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: \_\_\_\_\_. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.
6. ☐ Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
- The status of the claim(s) is (or will be) as follows:
- Claim(s) allowed: \_\_\_\_\_.
- Claim(s) objected to: \_\_\_\_\_.
- Claim(s) rejected: 1, 2, 4 and 9.
- Claim(s) withdrawn from consideration: 5-8.

**AFFIDAVIT OR OTHER EVIDENCE**

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

**REQUEST FOR RECONSIDERATION/OTHER**

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: see attached papers.
12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08 or PTO-1449) Paper No(s). \_\_\_\_\_
13. ☐ Other: \_\_\_\_\_.

### ADVISORY ACTION

1. Applicant argues that "The scraping of the shoulder portions is merely a result of the sputter and does not establish a minimum length from the trench edge and the via edge as required in claim 1."

This argument is not persuasive because Shimizu (Figs. 3H and 3I) clearly teaches the pad trench 12b (Fig. 3H) including a scraping portion and a planar portion (Fig. 3I) formed between the trench edge and the via edge. Therefore, the combination of the scraping portion and the planar portion of the pad trench 12b does establish a minimum length from the trench edge and the via edge.

2. Applicant further argues that the scraping off of the via edge to expand a diameter of the via does not participate in preventing the peeling-off of the plug.

This argument is not persuasive because of the following reasons:

- First, it is noted that when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. *In re Best*, 195 USPQ 430, 433 (CCPA 1977). In this case, as asserted by Applicant, the peeling-off of the plugs from the metal wirings results from the trench termination overhang Xto (see Applicant's Fig. 2C), the trench termination overhang Xto includes a first trench depth d1, a second trench depth d2 and a transition trench depth d3, where d2, d3, d1 (pages 7-8 of Applicant's specification). Similarly, Shimizu also discloses a copper interconnect structure having a trench termination overhang 12b (Fig. 3I), the trench termination overhang 12b includes a first trench depth

d1, a second trench depth d2 and a transition trench depth d3 (corresponding to scrap-off portion between the edge of the via 12a and the edge of the trench 16). Therefore, because the trench termination overhang of Applicant is not different from the trench termination overhang of Shimizu, the trench termination overhang 12b of Shimizu would have the same properties of preventing the peeling-off of the plugs from the metal wirings.

- Second, it is further noted that once a reference teaching product appearing to be substantially identical is made the basis of a rejection and the examiner presents evidence or reasoning tending to show inherency, the burden shift to Applicant to show an unobvious difference. *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980). In this case, Applicant fails to provide the reasons to support that why the trench termination overhang 12b of Shimizu would not have the same properties of preventing the peeling-off of the plugs from the metal wirings even though the trench termination overhang of Applicant is not different from the trench termination overhang of Shimizu.

3. Applicant also argues that Watanabe does not teach or suggest a minimum length between a via edge and a trench edge in a range as claimed.

This argument is not persuasive because of the following reasons:

- First, Watanabe (Figs. 24b-24c) clearly teaches a forming of a copper interconnect structure comprising a trench 603 formed over a plurality of vias 602, the trench 603 extends a length of 0.4 um beyond the edge of the via 602 closest to the first edge of the trench (par. [0175]). Specifically, Watanabe discloses that "16 via patterns 602 can be formed per one wiring pattern". "In this example, it is assumed that the

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width  $W$  of the wiring patterns ... 603 is 10  $\mu\text{m}$ , and pitch  $P$  of the via patterns 602 is 0.6  $\mu\text{m}$ ." Accordingly, the total pitch  $P$  of the 16 via patterns would be equal 9.6  $\mu\text{m}$  (16 via  $\times$  0.6  $\mu\text{m}$ ), and the length between a via edge and a trench edge would be equal the different between the width  $W$  of the wiring pattern 603 (i.e., 10  $\mu\text{m}$ ) and the total pitch  $P$  of the 16 via patterns (i.e., 9.6  $\mu\text{m}$ ) or equal 0.4  $\mu\text{m}$  (10  $\mu\text{m}$  – 9.6  $\mu\text{m}$ ). Therefore, Watanabe does teach a minimum length between a via edge and a trench edge in a range as claimed.

- Second, there is nothing in the Applicant specification, which supports that the peeling-off of the plugs from the metal wirings will not result for the trench extension overhang less than 0.2  $\mu\text{m}$  beyond the edge of a via. It appears that the peeling-off of the plugs from the metal wirings would be prevented for any lengths of the trench extension overhang. It should be noted that "the law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims ... In such a situation, the Applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F. 2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990).

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is 571-272-1703. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PC  
November 22, 2005

  
PHAT X. CAO  
PRIMARY EXAMINER